Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

DRAFT

January 22, 2021

Cherry C. Karlson, Chair
Wayland Board of Selectmen
41 Cochituate Road
Wayland, MA 01778

RE: Wayland-BWR\WMA
Renewal Application
WMA Permit #9P4-3-14-315.01
Action: Draft Renewed Permit

Dear Ms. Karlson:

Please find the attached documents:

- DRAFT Findings of Fact in Support of the New Permit #9P4-3-14-315.01; and
- DRAFT Water Management Act Permit #9P4-3-14-315.01 (Concord Basin) for the Wayland Water Department.

Consistent with 310 CMR 36.27 (6)-(8) of the revised Water Management Act Regulations promulgated on November 7, 2014, the Department will now publish notice in the Environmental Monitor that a DRAFT Permit is available for review and comment for 30 days following January 22, 2021 publication in the Environmental Monitor. Notice of the public comment period will also be sent to all registrants, permittees and those having non-consumptive use statements within the Concord Basin. The Department expects to issue the final permit within 30 days of the close of the public comment period.

The signature on this cover letter indicates formal issuance of the attached document. If you have any questions regarding this information, please contact Shi Chen via e-mail at shi.chen@mass.gov or Duane LeVangie via e-mail at duane.levangie@mass.gov .

Very truly yours,

Duane LeVangie,
Water Management Program Chief
Bureau of Water Resources

Y:\DWPAchive\NERO\ Wayland- 3315000-DRAFT Permit 9P431431501-2021-1-22
Y:\DWPWMA\PermitRenewals\Concord\Wayland- 3315000-DRAFT Permit 9P431431501-2021-1-22
Ecc: Jen Pederson, MWWA
Alison Field-Juma, OARS
Julia Blatt, Massachusetts Rivers Alliance
Sarah Bower, Massachusetts Rivers Alliance
Don Millette, Wayland Water Department Superintendent

Massachusetts Department of Environmental Protection
One Winter Street, Boston MA 02108 • Phone: 617-292-5751
Communication For Non-English Speaking Parties - 310 CMR 1.03(5)(a)

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이 문서는 중요하고 즉시 번역해야합니다. 당신이 번역이 문서가 필요하면 아래의 전화 번호로 MassDEP 의 다양성 감독에 문의하시기 바랍니다.

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این سند مهم است و باید فورا ترجمه شده است.
اگر شما نیاز به این سند ترجمه شده، لطفا با ما تماس تنوع مدیر PMassDE در شماره تلفن های ذکر شده در زیر.

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यह दस्तावेज महत्वपूर्ण है और तुरंत अनुवाद किया जाना चाहिए. आप अनुवाद इस दस्तावेज़ की जरूरत है, नीचे सूचीबद्ध फोन नंबरों पर MassDEP की विविधता निदेशक से संपर्क करें.

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

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Findings of Fact in Support of
DRAFT Water Management Permit # 9P4-3-14-315.01
Town of Wayland

The Department of Environmental Protection (the Department or MassDEP) makes the following Findings of Fact in support of the attached Draft Water Management Permit #9P4-3-14-315.01, and includes herewith its reasons for issuing the Draft Permit and for conditions of approval imposed, as required by M.G.L. c. 21G, § 11. The issuance of this permit is in response to a Water Management Act (WMA) permit renewal application by the Town of Wayland.

The Department adopted revised Water Management Regulations at 310 CMR 36.00 on November 7, 2014, (described in greater detail below). Since that time, the Department has been working closely with each Water Management Act permittee to fully consider all aspects of their individual situations and ensure thoughtful and implementable permits.

The Town of Wayland Withdrawal Summary

The Town of Wayland (Wayland) is registered to withdraw an annual daily average volume of 1.66 million gallons per day (MGD) from seven groundwater sources (Wells 3315000-01G through -07G) in the Concord Basin. See Registration #3-14-315.02. On October 2003, the Department issued Wayland a WMA Permit in order to add the Chamberlain Well as an authorized withdrawal point and to increase the authorized volume. The registered wells were not added to the permit as withdrawal points, therefore they are limited to the registered withdrawal volume of 1.66 MGD.

The Permit Extensions

Wayland`s WMA permit was initially set to expire on August 31, 2011. Prior to that date, the Permit Extension Act, Section 173 of Chapter 240 of the Acts of 2010, as amended by Sections 74 and 75 of Chapter 238 of the Acts of 2012, extended all existing permits by four years. Therefore, WMA permits for withdrawals in the Concord River basin were extended to August 31, 2015.

On April 8, 2015, the Department informed Wayland that the Department would need additional time before making a determination on the application in order to ensure that all permit renewal applicants in the Concord River Basin fully understood the new Water Management Regulations

(discussed below), and to give proper consideration to all permit renewal applications within the basin. Pursuant to M.G.L. c. 30A, § 13, and 310 CMR 36.18(7), Wayland's permit continues in force and effect until the Department issues a final decision on the permit renewal application.

On August 27, 2015, Wayland applied to MassDEP for a permit renewal in the Concord River Basin. The Department published notice of the permit renewal application in the Environmental Monitor on December 9, 2015. No comments were received. On March 6, 2020, Wayland was issued a Permit Renewal Order to Complete (OTC) outlining specific information that was required to renew Wayland's permit. Wayland responded on June 29, 2020.

The expiration date for all permits going forward in the Concord River Basin will be August 31, 2031, in order to restore the staggered permitting schedule set forth in the regulations.

The Water Management Act (M.G.L. c. 21G)

The Water Management Act (Act) requires the Department to issue permits that balance a variety of factors including without limitation:

- Impact of the withdrawal on other water sources;
- Water available within the safe yield of the water source;
- Reasonable protection of existing water uses, land values, investments and enterprises;
- Proposed use of the water and other existing or projected uses of water from the water source;
- Municipal and Massachusetts Water Resources Commission (WRC) water resource management plans;
- Reasonable conservation consistent with efficient water use;
- Reasonable protection of public drinking water supplies, water quality, wastewater treatment capacity, waste assimilation capacity, groundwater recharge areas, navigation, hydropower resources, water-based recreation, wetland habitat, fish and wildlife, agriculture, flood plains; and
- Reasonable economic development and job creation.

Water Management Regulation Revisions

In 2010 the Executive Office of Energy and Environmental Affairs (EEA) convened the Sustainable Water Management Initiative (SWMI) for the purpose of incorporating the best available science into the management of the Commonwealth's water resources. SWMI was a multi-year process that included a wide range of stakeholders and support from the Departments of Environmental Protection, Fish and Game, and Conservation and Recreation. In November 2012 the *Massachusetts Sustainable Water Management Initiative Framework Summary* (http://www.mass.gov/eea/docs/eea/water/swmi-framework-nov-2012.pdf) was released.

On November 7, 2014, the Department adopted revised Water Management Regulations at 310 CMR 36.00 that incorporate elements of the SWMI framework and the Water Conservation Standards adopted by the Massachusetts WRC. The regulations reflect a carefully developed balance to protect the health of Massachusetts' water bodies while meeting the needs of businesses and communities for water.

Without limitation, the Department has incorporated the following into Water Management permitting:

- Safe yield determinations for the major river basins based on a new methodology developed through SWMI (see the Safe Yield in the Concord Basin section of this document or for more information on the Safe Yield methodology, go to the November 28, 2012 SWMI Framework Summary and Appendices);
- Water needs forecasts for public water suppliers developed by the Department of Conservation and Recreation, Office of Water Resources (DCR), using a methodology reviewed and approved by the Massachusetts WRC;
- Water supply protection measures for public water supplies including Zone II delineations for groundwater sources, and wellhead and surface water protection measures as required by Massachusetts Drinking Water Regulations (310 CMR 22.00);

Water conservation standards reviewed and approved by the WRC in July 2006 and revised in July 2018 (https://www.mass.gov/doc/massachusetts-water-conservation-standards-2)/ including without limitation;

  - performance standard of 65 residential gallons per capita day or less;
  - performance standard of 10% or less unaccounted for water;
  - seasonal limits on nonessential outdoor water use;
  - a water conservation program that includes leak detection and repair, full metering of the system and proper maintenance of the meters, periodic review of pricing, and education and outreach to residents and industrial and commercial water users; and

- Environmental protections developed through SWMI, including without limitation;
  - protection for coldwater fish resources;
  - minimization of withdrawal impacts in areas stressed by groundwater use;
  - mitigation of the impacts of increasing withdrawals.

Safe Yield in the Concord River Basin

This permit is being issued under the safe yield methodology adopted by the Department on November 7, 2014, and described in the regulations at 310 CMR 36.13. As of the date of issuance of this permit, the Safe Yield calculation for the Concord River Basin is 87.50 million gallons per day (MGD), and total registered and permitted withdrawals are 36.79 MGD. The withdrawals authorized by this renewed permit and all other permits currently being renewed in the Concord River Basin, will be within the safe yield of the Concord River Basin and may be further conditioned by the regulations.

Findings of Fact for Permit Conditions in Wayland's Water Management Act Permit

The Findings of Fact for the special conditions included in the permit generally describe the rationale and background for each special condition in the DRAFT permit. This summary of permit special conditions is not intended to, and should not be construed as, modifying any of the permit special conditions. In the event of any ambiguity between this summary and the actual permit conditions, the permit language shall control.

Special Condition 1, Maximum Authorized Annual Average Withdrawal Volume, specifies the registered withdrawal volume of 1.66 MGD and a permitted increase of 0.11 MGD, for a total of 1.77 MGD. The Department of Conservation and Recreation (DCR) recommended a temporary allocation of water be used in the renewed permit because a Water Needs Forecast (WNF) could not be completed due to the high unaccounted-for water (UAW) by Wayland during the years (2010-2014) evaluated. Wayland has taken steps to reduce their UAW in recent years and may contact DCR in the future to evaluate developing a WNF. Note that if more than 1.77 MGD is expected to be withdrawn, Wayland must obtain a new permit at the higher volume and will need a new WNF.

Special Condition 2, Maximum Authorized Daily Withdrawals from each Withdrawal Points, specifies the maximum daily withdrawal rates by source, according to MassDEP approved Zone II rates.

Special Condition 3, Ground Water Supply Protection, A portion of the Zone II area for the permitted Chamberlain Well extends into Sudbury. Wayland is required to repeat the Best Effort Requirements per 310 CMR 22.21 (1) to encourage the Town of Sudbury to include Wayland`s Zone II in Sudbury`s Water Resource Protection District within one year of the permit`s issuance.

Special Condition 4, Performance Standards for Residential Gallons Per Capita Day Water Use and
Special Condition 5, Performance Standard for Unaccounted for Water are part of the *Water Conservation Standards for the Commonwealth of Massachusetts* adopted by the MA Water Resources Commission in July 2018 and can be found at https://www.mass.gov/files/documents/2018/09/11/ma-water-conservation-standards-2018.pdf.

The **Residential Gallons Per Capita Day** performance standard required of all PWS permittees is 65 RGPCD. Permittees that cannot meet the performance standard within the timeframe in the permit must meet Functional Equivalence requirements outlined in Appendix A.

Wayland's RGPCD for the last five years has not consistently met the performance standard, particularly during dry years. This permit limits nonessential outdoor water use to no more than 2 days per week whenever RGPCD is below 65 for the previous year, and to no more than 1 day per week whenever RGPCD is above 65 for the previous year.

Wayland's Residential Gallons Per Capita Day				
2018	**2017**	**2016**	**2015**	**2014**
64	**66**	**70**	**63**	**65**

The **Unaccounted for Water** performance standard required for all PWS permittees is 10% for 2 out of every 3 years. Permittees that cannot comply within the timeframe in the permit must meet Functional Equivalence requirements based on the AWWA/IWA Water Audits and Loss Control Programs, Manual of Water Supply Practices M36, as outlined in Appendix B.

Wayland's recent UAW has been:

Wayland's Unaccounted-for-Water				
2018	**2017**	**2016**	**2015**	**2014**
11.5%	12.8%	12.5%	15.2%	16.1%

An audit based on the AWWA/IWA Water Audits and Loss Control Programs, Manual of Water Supply Practices M36 was completed by Tata & Howard, Inc for Wayland in 2018 using the water withdrawal data from the periods of 2013-2015. The data validity score for those three years covered in the audit was 68 out of 100, which met the Level III (51-70) requirement. A Leakage Component Analysis (LCA) was conducted to identify causes of real and apparent water loss. The LCA identified the background leakage to be 33.58 million gallons (mg) and the real losses to be 44.97 mg. In addition to the LCA, a Water Loss Control Program was developed. The program includes measures of conducting an audit annually based on the AWWA/IWA Water Audits and Loss Control Programs, Manual of Water Supply Practices M36, practicing good record keeping and tracking every breaks, leaks and flushing, etc., completing one leak detection survey annually, utilizing the Capital Efficiency Plan (CEP) to prioritize water distribution system improvements, implementing an Advanced Metering Infrastructure (AMI) and replacing water meters.

Within six months of the issuance of the final permit, Wayland should submit the proposed implementation schedule for each measures listed in the Water Loss Control Program and the funding sources for those measures. Continued implementation of those measures will be a condition of the permit in place of meeting the 10% UAW performance standard. Discontinuation of the Water Loss Program may be approved by the Department when Wayland achieves below 10% UAW for four consecutive years and the water audit data validity scores are at least Level III (51-70) for the same four years.

Special Condition 6, Seasonal Limits on Nonessential Outdoor Water Use specifies the restrictions on nonessential outdoor water use from May through September and has changed since the existing permit issued in 2010. The options outlined in Special Condition 6 are based on whether reported RGPCD for the previous year was in compliance with the RGPCD Performance Standard (see Special Condition 5, Performance Standard for RGPCD).

In addition, outdoor water use by suppliers, like Wayland, with wells in August net groundwater depleted subbasins[1] is limited to one or two days per week to minimize withdrawals from depleted subbasins.

Each year Wayland may choose one of two options for implementing nonessential outdoor watering restrictions.

[1] Subbasins used for WMA permitting are the 1,395 subbasins delineated by the U.S. Geological Survey in *Indicators of Streamflow Alteration, Habitat Fragmentation, Impervious Cover, and Water Quality for Massachusetts Stream Basins* (Weiskel *et al.*, 2010, USGS SIR 2009-5272).

- **Calendar triggered restrictions** are in place from May 1st through September 30th. Many public water suppliers find this option easier to implement and enforce than the streamflow triggered approach
- **Streamflow triggered restrictions** are implemented at those times when streamflow falls below designated flow triggers measured at an assigned, web-based, real-time U.S. Geologic Survey (USGS) stream gage from May 1st through September 30th. At a minimum, restrictions commence when streamflow falls below the trigger for three consecutive days. Once implemented, the restrictions remain in place until streamflow at the assigned USGS local stream gage meets or exceeds the trigger streamflow for seven consecutive days.

- If Wayland selects the streamflow trigger approach, it has been assigned USGS stream gage #01099500 –Concord River below Meadow Brook, at Lowell, MA. The local gage streamflow triggers at this site are **427** cubic feet per second (cfs) for May and June, and **156** cfs for July, August and September. Should the reliability of flow measurement at this gage be so impaired as to question its accuracy, Wayland may request MassDEP's review and approval to transfer to another gage to trigger restrictions. MassDEP reserves the right to require use of a different gage.

- **The 7-Day Low Flow Trigger**, at which restrictions increase, is incorporated into both Calendar and Streamflow Triggered restrictions in order to provide additional protection to streamflows when flows are very low. The 7-day low flow trigger is based on the median value of the annual 7-day low flows for the period of record. The 7 day low-flow trigger for the Concord River below Meadow Brook gage is **71** cfs.

Wayland may choose to implement limits on nonessential outdoor water use that are stricter than those required by the permit. This permit condition does not confer enforcement authority to the permittee. Wayland's Bylaw 190 includes enforcement authority and establishes penalties for violations of the permit restrictions.

Special Condition 7, Requirement to Report Raw and Finished Water Volumes, ensures that the information necessary to evaluate compliance with the conditions included herein is accurately reported.

Special Condition 8, Water Conservation Requirements, incorporates the Water Conservation Standards for the Commonwealth of Massachusetts reviewed and approved by the Water Resources Commission in July 2018 (https://www.mass.gov/doc/massachusetts-water-conservation-standards-2).

Special Condition 9, Minimization of Groundwater Withdrawal impacts in Stressed Subbsins, requires permittees with permitted groundwater sources in subbasins with net groundwater depletion (August NGD) of 25% or more during August to minimize their withdrawal impacts on those subbasins to the greatest extent feasible, through optimization of groundwater source use, surface water releases to improve streamflows, outdoor water use

restrictions and water conservation programs that go beyond standard Water Management permit requirements.

Wayland`s permitted groundwater source (3315000-08G) is located in Subbasin 12077 which has an August NGD of 37.7%. Therefore, Wayland must prepare a Minimization Plan.

Based on the Department's records and information submitted by Wayland, the Department finds that minimization requirements will be met as follows:

- Wayland`s sources are located in Subbasin 12077 (3315000-01G, 02G, 06G, 07G, 08G) with an August NGD of 37.7% and in Subbain 12092 (3315000-03G, 04G, 05G) with an August NGD of 34.7%. This permit does not require that Wayland shift additional pumping to another subbasin because both subbasins have an August NGD of more than 25%.

- Wayland has no surface water supplies and, therefore cannot make releases to improve streamflow.

- The limits on nonessential outdoor water use set forth in Special Condition 6 are restrictions developed to minimize withdrawals in August net groundwater depleted subbasins.

- Wayland has started planning for an advanced metering infrastructure (AMI) implementation and water meter replacement program to improve meter reading accuracy and reduce water loss. Wayland is required to submit the proposed implementation schedule for the meter replacement program within six months of the issuance of the final permit.

- Wayland`s Chapter 191 Lawn Irrigation Systems Bylaw, adopted by the Annual Town Meeting on April 3, 2003 under its common law police powers to protect public health and welfare, MGL.c.40, §21, and under the Town of Wayland`s authority to regulate water use through its Board of Public Works pursuant to Chapter 80 of the Acts of 1878, includes application procedures, system requirements, rules and regulations, and violations and penalties to ensure proper installation and efficient operation of automatic sprinkler systems.

Special Condition 10, Mitigation of Impacts for Withdrawals that Exceed Baseline Withdrawals, requires mitigation where feasible, for withdrawals over a baseline volume. Baseline withdrawal means the volume of water withdrawn during calendar year 2005 plus 5%, or the average annual volume withdrawn from 2003 through 2005 plus 5%, whichever is greater provided that:

a) baseline cannot be less than a permittee's registered volume;
b) baseline cannot be greater than the permittee's authorized volume for 2005; and
c) if during the period from 2003 to 2005, the permittee's withdrawals from the water source were interrupted due to contamination of the source or construction of a

treatment plant, the Department will use best available data to establish a baseline volume from the water source.

Baseline Withdrawal and Mitigation Calculation**:** Wayland's baseline is 1.72 MGD, based on withdrawals made in 2005 plus 5%. Wayland's water withdrawals in recent years have been below the 1.72 MGD baseline.

Wayland's Annual Average Withdrawals (MGD)				
2019	**2018**	**2017**	**2016**	**2015**
1.40	1.37	1.45	1.66	1.47

Wayland requested to renew its existing permitted volume of 0.11 MGD for a total allocation of 1.77 MGD. No mitigation is required until Wayland`s total water withdrawals reach 1.72 MGD. Mitigation measures must be in place prior to Wayland making withdrawals of more than the 1.72 MGD baseline.

The mitigation volume calculation below assumes that Wayland's future withdrawals will be discharged to on-site septic systems at the same rate (98%) as current water withdrawals. A "wastewater adjustment" is calculated for water withdrawn that is returned to the ground as wastewater within the same major basin. MassDEP will assume that 85% of water delivered to customers with septic systems will be returned to the ground within the same major basin as the withdrawal, thus reducing the amount of mitigation needed. After calculating the adjustment for authorized withdrawals over baseline that will be returned to groundwater through septic system discharge (Step 2 below), Wayland's total mitigation requirement will be up to 8,350 gallons per day (Step 3 below).

Wayland's Wastewater Adjustment Calculation for Mitigation
1. Permitted amount above Baseline = 0.05 MGD • Permitted amount above Baseline: 1.77 – 1.72 = 0.05 MGD
2. Adjustment for Wastewater Discharge to Local Groundwater = 0.04165 MGD • 98% of increased withdrawals are delivered to areas with on-site septic systems: 0.05 MGD x 0.98 (98%) = 0.049 MGD • 85% of water delivered to areas with on-site septic systems returns to groundwater: 0.049 MGD x 0.85 (85%) = 0.04165 MGD
3. Amount to be Mitigated after Adjustment for Wastewater Discharge to Local Groundwater = 0. 00835 MGD • Permitted amount above baseline (0.05 MGD) – adjustment for wastewater discharge to local groundwater (0.04165 MGD) = 0.00835 MGD or 8,350 gallons per day

Because Wayland`s authorized volume exceeds its baseline volume, a mitigation plan is required. Wayland identified a stormwater recharge project at Wayland High School for its mitigation plan.

Stormwater BMPs that were built on or after January 1, 2005 that infiltrate stormwater from previously directly connected impervious surfaces[2] are eligible for Direct Mitigation credits. The BMP mitigation credit is calculated based on average annual precipitation, BMP design infiltration depth[3], and the area of directly connected impervious surface built prior to 2005 re-directed to the BMP built on or after January 1, 2005. Wayland's stormwater BMPs at Wayland High School located at 264 Old Connecticut Path qualified for credits. Based on the information provided by Wayland, the BMPs were completed in 2012. The BMPs infiltrate a total of 0.013 MGD of stormwater.

Coldwater Fish Resource Protection was incorporated into the Water Management Regulations in November 2014. Coldwater Fish Resource Protection is not a condition of this permit because Wayland's withdrawals do not impact any waters that the MA Division of Fisheries and Wildlife has identified as supporting coldwater fish.

[2] Directly connected impervious surfaces are those whose runoff discharges to a surface water body.
[3] BMP design infiltration depth is the inches of runoff from 24 hours of precipitation that is infiltrated via a BMP in 72 hours, per MA Stormwater Handbook, Vol. 3, Ch. 1, page 25

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

DRAFT WATER WITHDRAWAL PERMIT
#9P4-3-14-315.01
TOWN OF WAYLAND

This renewal of Permit 9P4-3-14-315.01 is issued pursuant to the Massachusetts Water Management Act for the sole purpose of authorizing the withdrawal of a volume of water as stated below and subject to the following special and general conditions. This permit conveys no right in or to any property beyond the right to withdraw the volume of water for which it is issued.

PERMIT NUMBER: 9P4-3-14-315.01 **RIVER BASIN:** Concord

PERMITTEE: Town of Wayland

EFFECTIVE DATE: XXXX, 2021

EXPIRATION DATE: August 31, 2031

NUMBER OF WITHDRAWAL POINTS:
Groundwater: 1
Surface Water: 0

USE: Public Water Supply

DAYS OF OPERATION: 365

Table 1: WITHDRAWAL POINT IDENTIFICATION

Source Name	PWS Source ID Code
Chamberlain Well	3315000-08G

SPECIAL CONDITIONS

1. Maximum Authorized Annual Average Withdrawal Volume

This permit authorizes the Town of Wayland (Wayland) to withdraw water from the Concord Basin at the rate described below (Table 2). This permitted volume is in addition to the 1.66 million gallons per day (MGD) that Wayland is authorized to withdraw from its sources in the Concord River Basin under its WMA Registration #3-14-315.02. The permitted volume is expressed both as an annual average daily withdrawal rate, MGD, and as a total annual withdrawal volume, million gallons per year (MGY), for each permit period over the term of this permit. The Department of Environmental Protection (MassDEP or the Department) bases these withdrawal volumes on the raw water withdrawn from the authorized withdrawal points and will use the raw water amount to assess compliance with the registered and permitted withdrawal volumes.

Table 2: Maximum Authorized Withdrawal Volumes

Permit Periods	Total Raw Water Withdrawal Volumes			
	Permit		Permit + Registration	
	Daily Average (MGD)	Total Annual (MGY)	Daily Average (MGD)	Total Annual (MGY)
XXX/2021 to 08/31/2026	0.11	40.15	0.11+1.66=1.77	646.05
09/01/2026 to 08/31/2031	0.11	40.15	0.11+1.66=1.77	646.05

2. Maximum Authorized Daily Withdrawals from each Withdrawal Point

Withdrawals from permitted withdrawal points are not to exceed the approved maximum daily volumes listed below without specific advance written approval from MassDEP (Table 3). The authorized maximum daily volume is the approved rate of each source. In no event shall the combined withdrawals from the individual withdrawal points exceed the withdrawal volumes authorized above in Special Condition 1.

Table 3: Maximum Daily Withdrawal Volumes

Source Name	PWS Source Code ID	Maximum Daily Rate (MGD)
Chamberlain Well	3315000-08G	0.828

3. Ground Water Supply Protection

According to MassDEP`s records, Wayland is required to repeat the Best Effort Requirements per 310 CMR 22.21 (1) to encourage the Town of Sudbury to include Wayland`s Zone II in Sudbury`s Water Resource Protection District. Wayland shall complete this effort within one year of the permit's issuance. If you need assistance on groundwater supply protection requirements, please contact Catherine Hamilton of MassDEP`s Boston Office at 617-556-1070.

4. Performance Standard for Residential Gallons Per Capita Day Water Use

Wayland's performance standard for residential gallons per capita day (RGPCD) is 65 gallons or less. Wayland shall be in compliance with this performance standard, if Wayland does not meet the standard, Wayland shall be in compliance with the functional equivalence requirements (Appendix A).

Wayland shall report its RGPCD water use annually in its Annual Statistical Report (ASR).

5. Performance Standard for Unaccounted for Water

Within six months of the issuance of the permit, Wayland should submit the proposed implementation schedule for the following measures that are listed in its Water Loss Control Program (attached) and the funding sources for those measures:

- Conducting an audit based on the AWWA/IWA Water Audits and Loss Control Programs, Manual of Water Supply Practices M36 annually;
- Practicing good record keeping and tracking every breaks, leaks and flushing, etc.;
- Completing one leak detection survey annually;
- Utilizing the Capital Efficiency Plan (CEP) to prioritize water distribution system improvements;
- Implementing an Advanced Metering Infrastructure (AMI) and replacing water meters.

Continued implementation of those measures is required. Discontinuation of the Water Loss Program may be approved by the Department when Wayland achieves 10% UAW or less for four consecutive years and the water audit data validity scores are at least Level III (51-70) for the same four years.

6. Seasonal Limits on Nonessential Outdoor Water Use

Wayland shall limit nonessential outdoor water use through mandatory restrictions from May 1st through September 30th as outlined in below. To the extent feasible, all summer outdoor water use should take place before 9 a.m. and after 5 p.m. when evaporation and evapotranspiration rates are lower.

Table 4: Seasonal Limits on Nonessential Outdoor Water Use

For Permittees meeting the 65 RGPCD Standard for the preceding year RGPCD ≤ 65 as reported in the ASR and accepted by MassDEP	
Calendar Triggered Restrictions	Nonessential outdoor water use is allowed: a) **Two (2) days per week** before 9 am and after 5 pm; **and** b) **one (1) day per week** before 9 am and after 5 pm when USGS stream gage 01108000 – Concord River at Meadow Brook, at Lowell MA falls below **71 cfs** for three (3) consecutive days. Once streamflow triggered restrictions are implemented, they shall remain in place until streamflow at the gage meets or exceeds 71 cfs for seven (7) consecutive days.
Streamflow Triggered Restrictions	Nonessential outdoor water use is allowed: a) **Two (2) days per week** before 9 am and after 5 pm when USGS stream gage 01108000 – Concord River at Meadow Brook, Lowell, MA falls below: • May 1 – June 30: **427 cfs** for three (3) consecutive days • July 1 – September 30: **156 cfs** for three (3) consecutive day**s** b) **one (1) day per week** before 9 am and after 5 pm when USGS stream gage 01108000 – Concord River at Meadow Brook, Lowell, MA falls below **71 cfs** for three (3) consecutive days. Once implemented, the restrictions shall remain in place until streamflow at the gage meets or exceeds the trigger streamflow for seven (7) consecutive days.
For Permittees NOT meeting the 65 RGPCD standard for the preceding year RGPCD > 65 as reported in the ASR and accepted by MassDEP	
Calendar Triggered Restrictions	Nonessential outdoor water use is allowed **one (1) day per week** before 9 am and after 5pm;
Streamflow Triggered Restrictions	Nonessential outdoor water use is allowed one **(1) day per week** before 9 am and after 5 pm when USGS stream gage 01108000 – Concord River at Meadow Brook, Lowell , MA falls below: • May 1 – June 30: **427 cfs** for three (3) consecutive days • July 1 – September 30: **156 cfs** for three (3) consecutive days Once implemented, the restrictions shall remain in place until streamflow at the gage meets or exceeds the trigger streamflow for seven (7) consecutive days.

Instructions for Accessing Streamflow Website Information
If Wayland chooses Streamflow Triggered Restrictions, Wayland shall be responsible for tracking streamflows and drought advisories and recording and reporting to MassDEP when restrictions are implemented.
Streamflow information is available at the USGS National Water Information System (NWIS): Web Interface. The USGS NWIS default shows Massachusetts streamflows in real time, i.e., the most recent, usually quarterly hourly, reading made at each USGS stream gage. Seasonal Limits on Nonessential Outdoor Water Use are implemented when the mean daily streamflow falls below the designated trigger for 3 consecutive days. The mean daily flow is not calculated until after midnight each day when the USGS computes the hourly data into a mean daily streamflow. As a result, permittees must use the mean daily streamflow from the preceding day when tracking streamflows. **Mean daily streamflow gage** readings are available at the USGS NWIS Web Interface at http://waterdata.usgs.gov/ma/nwis/current/?type=flow. • Scroll down to 01099500 – Concord River below Meadow Brook at Lowell, MA. • Click on the gage number. • Scroll down to "Provisional Date Subject to Revision – Available data for this site" and click on the drop-down menu. • Click on "Time-series: Daily data" and hit GO. • Scroll down to the "Available Parameters" box. Within the box, be sure "00060 Discharge (Mean)" is checked, then, under "Output Format" click "Table" and hit GO. • Scroll down to "Daily Mean Discharge, cubic feet per second" table and find the current date on the table. • Compare the cubic feet per second (cfs) measurement shown on the table to the cfs shown under Streamflow Triggered Restrictions above.
Wayland shall document compliance with the Seasonal Nonessential Outdoor Water Use Restrictions annually in its Annual Statistical Report (ASR) and indicate whether it anticipates implementing calendar triggered restrictions or streamflow triggered restrictions during the next year.

Restricted Nonessential Outdoor Water Uses

Nonessential outdoor water uses that are subject to mandatory restrictions include:

- irrigation of lawns via automatic irrigation systems or sprinklers;
- filling swimming pools;
- washing vehicles, except in a commercial car wash or as necessary for operator safety; and
- washing exterior building surfaces, parking lots, driveways or sidewalks, except as necessary to apply surface treatments such as paint, preservatives, stucco, pavement or cement.

The following uses may be allowed when mandatory restrictions are in place:

- irrigation to establish a new lawn and new plantings during the months of May and September;
- irrigation of public parks and recreational fields before 9 a.m. and after 5 p.m.;
- irrigation of gardens, flowers and ornamental plants by means of a hand-held hose or drip irrigation system; and
- irrigation of lawns by means of a hand-held hose.

Water uses NOT subject to mandatory restrictions are those required:

- for health or safety reasons;
- by regulation;
- for the production of food and fiber;
- for the maintenance of livestock; or
- to meet the core functions of a business (for example, irrigation by golf courses as necessary to maintain tees, greens, and minimal fairway watering, or irrigation by plant nurseries as necessary to maintain stock).

Public Notice of Seasonal Nonessential Outdoor Water Use Restrictions

Wayland shall notify its customers of the restrictions, including a detailed description of the restrictions and penalties for violating the restrictions, by April 15th each year.

Notice that restrictions have been put in place shall be filed each year with the Department within 14 days of the restriction's effective date. Filing shall be in writing on the form "Notification of Water Use Restrictions" available on MassDEP website.

Nothing in the permit shall prevent Wayland from implementing water use restrictions that are more stringent than those set forth in this permit.

7. Requirement to Report Raw and Finished Water Volumes

Wayland shall report annually on its ASR the raw water volumes and finished water volumes for the entire water system and the raw water volumes for individual water withdrawal points.

8. Water Conservation Requirements

At a minimum, Wayland shall implement the following conservation measures forthwith. Compliance with the water conservation requirements shall be reported to MassDEP upon request, unless otherwise noted below.

Table 5: Minimum Water Conservation Requirements

System Water Audits and Leak Detection

1. At a minimum, conduct a full leak detection survey every three years. A full leak detection survey should be completed by December 31, 2021.
2. Conduct leak detection of the entire distribution system within one year whenever the percentage of UAW increases by 5% or more (for example an increase from 3% to 8%) over the percentage reported on the ASR for the prior calendar year. Within 60 days of completing the leak detection survey, submit to the Department a report detailing the survey, any leaks uncovered as a result of the survey or otherwise, dates of repair and the estimated water savings as a result of the repairs.
3. Conduct field surveys for leaks and repair programs in accordance with the AWWA Manual 36.
4. Repair reports shall be kept available for inspection by the Department. The permittee shall establish a schedule for repairing leaks that is at least as stringent as the following:
    - Leaks of 3 gallons per minute or more shall be repaired within 3 months of detection.
    - Leaks of less than 3 gallons per minute at hydrants and appurtenances shall be repaired as soon as possible.
    - Leaks of less than 3 gallons per minute shall be repaired in a timely manner, but in no event more than 6 months from detection, except that leaks in freeway, arterial or collector roadways shall be repaired when other roadwork is being performed on the roadway.
    - Leaks shall be repaired in accordance with the permittee's priority schedule including leaks up to the property line, curb stop or service meter, as applicable.
    - Permittee shall have water use regulations in place that require property owners to expeditiously repair leaks on their property.

    The following exceptions may be considered:
    - Repair of leakage detected during winter months can be delayed until weather conditions become favorable for conducting repairs;* and
    - Leaks in freeway, arterial or collector roadways may be coordinated with other scheduled projects being performed on the roadway**.

    *Reference: MWRA regulations 360 CMR 12.09

    **Mass Highway or local regulations may regulate the timing of tearing up pavement to repair leaks.

Metering

1. Calibrate all source, treatment and finished water meters at least annually and report date of calibration on the ASR.
2. One hundred percent (100%) metering of the system is required. All water distribution system users shall have properly sized service lines and meters that meet AWWA

calibration and accuracy performance standards as set forth in AWWA Manual M6 – Water Meters.
3. The permittee shall have an ongoing program to inspect individual service meters to ensure that all service meters accurately measure the volume of water used by its customers. The metering program shall include regular meter maintenance, including testing, calibration, repair, replacement and checks for tampering to identify and correct illegal connections. The plan shall continue to include placement of sufficient funds in the annual budget to calibrate, repair, or replace meters as necessary.
Pricing
1. Establish a water pricing structure that includes the full cost of operating the water supply system. Full cost pricing recovers all costs as applicable, including: o pumping and distribution equipment cost, repair and maintenance; o water treatment; o electricity; o capital investment, including planning, design and construction; o land purchase and protection; o debt service; o administrative costs including systems management, billing, accounting, customer service, service studies, rate analyses and long-range planning; o conservation program including audits, leak detection equipment, service and repair, meter replacement program, automated meter reading installation and maintenance, conservation devices, rebate program, public education program; o regulatory compliance; and o staff salaries, benefits training and professional development.
2. Evaluate rates at a minimum every three to five years and adjust costs as needed.
3. Permittee shall not use decreasing block rates. Decreasing block rates which charge lower prices as water use increases during the billing period, are prohibited by M.G.L. Chapter 40 Section 39L.
4. If billing frequency is less than quarterly (i.e. annual or biannual), implement quarterly or more frequent meter reading and billing as soon as practicable.
Residential and Public Sector Conservation
1. Meet all standards set forth in the Federal Energy Policy Act, 1992, and the Massachusetts Plumbing Code.
2. Meter or estimate water used by contractors using fire hydrants for pipe flushing and construction.
3. Wayland shall continue to ensure that water savings devices are installed in all municipal buildings as they are renovated, and shall ensure water conserving fixtures and landscaping practices are incorporating into the design of new municipal capital projects.
Industrial and Commercial Water Conservation
1. Wayland shall ensure implementation of water conservation practices, including the installation of WaterSense compliant low flow plumbing fixtures where applicable, and low water use landscaping in all development proposals.

Lawn and Landscape
1. Develop and adopt or update as necessary, a water use restriction bylaw, ordinance or regulation that authorizes enforcement of the seasonal limits on nonessential outdoor water use. MassDEP has developed the "DEP Model Outdoor Water Use Bylaw/Ordinance" to help municipalities and water districts implement seasonal water conservation requirements. The Model Bylaw also includes options for regulating private wells and in-ground irrigation systems. See http://www.mass.gov/eea/agencies/massdep/water/regulations/model-water-use-restriction-bylaw-ordinance.html NOTE: Wayland's Bylaw 190, adopted by the Town of Wayland on May 6, 1998 with amendments noted where applicable, includes enforcement authority and establishes penalties for violations of the permit restrictions.
Public Education and Outreach
1. Develop and implement a water conservation and education plan designed to educate water customers on ways to conserve water. Without limitation, the plan may include the following actions: o Include in bill stuffers and/or bills, a work sheet to enable customers to track water use and conservation efforts and estimate the dollar savings; o Public space advertising/media stories on successes (and failures); o Conservation information centers perhaps run jointly with electric or gas company; o Speakers for community organizations; o Public service announcements; radio/T.V./audio-visual presentations; o Joint advertising with hardware stores to promote conservation devices; o Use of civic and professional organization resources; o Special events such as Conservation Fairs; o Develop materials that are targeted to schools with media that appeals to children, including materials on water resource projects and field trips; and o Provide multilingual materials as needed.
2. Upon request of MassDEP, permittee shall report on its public education and outreach efforts, including a summary of activities developed for specific target audiences, any events or activities sponsored to promote water conservation and copies of written materials.

9. Minimization of Groundwater Withdrawal Impacts in Stressed Subbasins

Wayland shall minimize the impacts of its groundwater withdrawals from its permitted source in Subbasin 12077, as follows:

- Implement seasonal limits on nonessential outdoor water use as outlined in Special Condition 6;
- Continue to implement the ongoing meter replacement program and submit the proposed implementation schedule within six months of the issuance of the permit;

- Continue to enforce Chapter 191 Lawn Irrigation Systems Bylaw, which requires the proper installation and efficient operation of automatic sprinkler systems adopted by the Annual Town Meeting of the Town of Wayland on April 3, 2003.

10. Mitigation of Impacts for Withdrawals that Exceed Baseline Withdrawals

Wayland is required to mitigate up to 0.00835 MGD (8,350 gpd) for its permitted withdrawals over its 1.72 MGD baseline withdrawal rate. The mitigation requirement of 0.00835 MGD is met through the stormwater recharge project located at Wayland High School, 264 Old Connecticut Path in Wayland. The project was completed in 2012. According to the information provided, the Wayland High School project with a design infiltration depth of 1 inch would infiltrate 0.013 MGD of stormwater for the 5.6 acres of directly connected impervious surface built before 2005 that was rerouted to the infiltration structure.

Wayland Water Department shall contact MassDEP should there be changes to the status of the mitigation project.

GENERAL CONDITIONS (applicable to all permittees)

1. **Duty to Comply** The permittee shall comply at all times with the terms and conditions of this permit, the Act and all applicable State and Federal statutes and regulations.

2. **Operation and Maintenance** The permittee shall at all times properly operate and maintain all facilities and equipment installed or used to withdraw up to the authorized volume so as not to impair the purposes and interests of the Act.

3. **Entry and Inspections** The permittee or the permittee's agent shall allow personnel or authorized agents or employees of the Department at reasonable times to enter and examine any property or inspect and copy any records for the purpose of determining compliance with this permit, the Act or the regulations published pursuant thereto, upon presentation of proper identification and an oral statement of purpose.

4. **Water Emergency** Withdrawal volumes authorized by this permit are subject to restriction in any water emergency declared by the Department pursuant to M.G.L. c. 21G, s. 15-17, M.G.L. c. 111, s. 160, or any other enabling authority.

5. **Transfer of Permits** This permit shall not be transferred in whole or in part unless and until the Department approves such transfer in writing, pursuant to a transfer application on forms provided by the Department requesting such approval and received by the Department at least thirty (30) days before the effective date of the proposed transfer. No transfer application shall be deemed filed unless it is accompanied by the applicable transfer fee established by 310 CMR 36.33.

6. **Duty to Report** The permittee shall submit annually, on the electronic Annual Statistical Report (eASR) accessed through the Department's eDEP website, a statement of the withdrawal. Such report must be submitted annually by the date identified on eDEP each

year, unless the permittee has explicit permission from the MassDEP Drinking Water program for an extension of time.

7. **Duty to Maintain Records** The permittee shall be responsible for maintaining withdrawal records in sufficient detail to assess compliance with the conditions of this permit.

8. **Metering** All withdrawal points included within the permit shall be metered. Meters are to be calibrated annually.

9. **Amendment, Suspension or Termination** The Department may amend, suspend or terminate the permit in accordance with M.G.L. c. 21G and 310 CMR 36.29.

APPEAL RIGHTS AND TIME LIMITS

This permit is a decision of the Department. Any person aggrieved by this decision and any person who has been allowed pursuant to 310 CMR 1.01(7) to intervene in the adjudicatory proceeding that resulted in this decision may request an adjudicatory hearing. Any such request must be made in writing, by certified mail or hand delivered, and received by the Department within twenty-one (21) days of the date of receipt of this permit. No request for an appeal of this permit shall be validly filed unless a copy of the request is sent by certified mail, or delivered by hand to the local water resources management official in the city or town in which the withdrawal point is located; and for any person appealing this decision, who is not the applicant, unless such person notifies the permit applicant of the appeal in writing by certified mail or by hand within five (5) days of mailing the appeal to the Department.

CONTENTS OF HEARING REQUEST

The request for a hearing shall state specifically, clearly and concisely the facts which are the grounds for the appeal, the relief sought, and any additional information required by 310 CMR 1.01(6)(b) or other applicable law or regulation. For any person appealing this decision who is not the applicant, the request must include sufficient written facts to demonstrate status as a person aggrieved and documentation to demonstrate previous participation where required.

FILING FEE AND ADDRESS

The hearing request, together with a valid check, payable to the Commonwealth of Massachusetts in the amount of $100 must be mailed to:

Commonwealth of Massachusetts
Department of Environmental Protection
P.O. Box 4062
Boston, MA 02211

The request shall be dismissed if the filing fee is not paid, unless the appellant is exempt or granted a waiver as described below.

EXEMPTIONS

The filing fee is not required if the appellant is a city or town (or municipal agency), county, district of the Commonwealth of Massachusetts, or a municipal housing authority.

WAIVER

The Department may waive the adjudicatory hearing filing fee for any person who demonstrates to the satisfaction of the Department that the fee will create an undue financial hardship. A person seeking a waiver must file, together with the hearing request, an affidavit setting forth the facts which support the claim of undue hardship.

_____ _____

Duane LeVangie, Program Chief
Water Management Act Program
Bureau of Water Resources

Date

Appendix A–Functional Equivalence with the 65 Residential Gallons Per Capita Day Performance Standard

MassDEP will consider PWS permittees who cannot meet the 65 RGPCD performance standard to be functionally equivalent, and in compliance with their permit, if they have an on-going program in place that ensures best practices for controlling residential water use as described below.

If the permittee fails to document compliance with the RGPCD performance standard in any Annual Statistical Report (ASR), then the permittee must file with that ASR a Residential Gallons Per Capita Day Compliance Plan (RGPCD Plan) which shall include, at a minimum:

1. A description of the actions taken during the prior calendar year to meet the performance standard;
2. An analysis of the cause of the failure to meet the performance standard;
3. A description of the actions that will be taken to meet the performance standard which must include, at a minimum, at least one of the following:
    a) a program that provides water saving devices such as faucet aerators and low flow shower heads at cost;
    b) a program that provides rebates or other incentives for the purchase of low water use appliances (washing machines, dishwashers, and toilets), or
    c) the adoption and enforcement of an ordinance, by-law or regulation to require the installation of moisture sensors or similar climate related control technology on all automatic irrigation systems;

    and may include, without limitation, the following:

    d) the use of an increasing block water rate or a seasonal water rate structure as a tool to encourage water conservation;
    e) a program that provides rebates or other incentives for the installation of moisture sensors or similar climate related control technology on automatic irrigation systems;
    f) the adoption and enforcement of an ordinance, by-law or regulation to require that all new construction include water saving devices and low water use appliances;
    g) the adoption and enforcement of an ordinance, by-law or regulation to require that all new construction minimize lawn area and/or irrigated lawn area, maximize the use of drought resistant landscaping, and maximize the use of top soil with a high water retention rate;
    h) the implementation of a program to encourage the use of cisterns or rain barrels for outside watering;
    i) the implementation of monthly or quarterly billing.
4. A schedule for implementation; and
5. An analysis of how the planned actions will address the specific circumstances that resulted in the failure to meet the performance standard.

If the permittee is already implementing one or more of these programs, it must include in its RGPCD plan the continued implementation of such program(s), as well as implementation of at least one additional program. All programs must include a public information component designed to inform customers of the program and to encourage participation in the program.

RGPCD plans may be amended to revise the actions that will be taken to meet the performance standard. Amended RGPCD plans must include the information set forth above.

If a RGPCD plan is required, the permittee must:

1. submit information and supporting documentation sufficient to demonstrate compliance with its RGPCD plan annually at the time it files its ASR, and
2. continue to implement the RGPCD plan until it complies with the performance standard and such compliance is documented in the permittee's ASR for the calendar year in which the standard is met.

Appendix B – Functional Equivalence: 10% Unaccounted for Water Performance Standard

MassDEP will consider PWS permittees who cannot meet the 10% UAW performance standard to be functionally equivalent, and in compliance with their permit, if they have an on-going program in place that ensures "best practices" for controlling water loss. The water loss control program will be based on annual water audits and guidance as described in the AWWA/IWA *Manual of Water Supply Practices – M36, Water Audits and Loss Control Programs* (AWWA M36).

If Wayland fails to document compliance with the Unaccounted for Water performance standard (UAW of 10% or less for 2 of the 3 most recent years throughout the permit period), then Wayland shall develop and implement a water loss control program following the *AWWA M36 Water Audits and Loss Control Programs* within 5 full calendar years of failing to meet the standard as follows:

1. Conduct an annual "top down" water audit, calculate the data validity level/score using AWWA Water Loss Control Committee's Free Water Audit Software, and submit the AWWA WLCC Free Water Audit Software: Reporting Worksheet and data validity score annually with its Annual Statistical Report (ASR).
    - If a PWS's data validity level/score is less than Level III (51-70), steps recommended through the audit(s) shall be taken to improve the reliability of the data prior to developing a long-term program to reduce real and apparent water losses.
    - Data with a validity score of 50 or less are considered too weak to be used to develop a component analysis or for infrastructure planning and maintenance.
    - Developing data with an acceptably strong validity score can be a multi-year process.
2. When the data validity score meets the Level III (51-70) requirement, conduct a component analysis to identify causes of real and apparent water loss and develop a program to control losses based on the results of the component analysis.
3. Within 5 full calendar years of failing to meet the standard, submit the component analysis and water loss control program with a proposed implementation schedule to the Department.
4. Continued implementation will be a condition of the permit in place of meeting the 10% UAW performance standard.
5. Upon request of the Department, the permittee shall report on its implementation of the water loss control program.

A PWS permittee may choose to discontinue the water loss program implementation if UAW, as reported on the ASR and approved by the Department, is below 10% for four consecutive years, and the water audit data validity scores are at least Level III (51-70) for the same four years.

NOTE FOR SMALL SYSTEMS: For small systems with less than 3,000 service connections or a service connection density of less than 16 connections per mile of pipeline, the Unavoidable Annual Real Loss (UARL) calculation and the Infrastructure Leak Index (ILI) developed as the final steps of the top down water audit may not result in valid performance indicators, and may not be comparable to the UARL and ILI calculations for larger systems.

However, these small systems can benefit from developing reliable data and conducting an annual top down water audit. Small systems can rely on the real losses (gallons per mile of main per day) performance indicator developed in the water audit as a measure of real water loss when developing a water loss control program. The M36 Manual discusses the audit process for small systems, and includes a chapter to guide small systems in understanding the results of their audits and in developing a water loss control program (*Manual of Water Supply Practices – M36, Fourth Edition, Chapter 9: Considerations for Small Systems*, pp. 293-305).

MassDEP UAW Water Loss Control Measures: If Wayland is required to develop a Functional Equivalence Plan for the 10% Unaccounted for Water Performance Standard, and Wayland does not have a MassDEP-approved Water Loss Control Program in place within 5 full calendar years of failing to meet the standard, Wayland will be required to implement the MassDEP UAW Water Loss Control Measures outlined below:

- An annual water audit and leak detection survey, as described in the AWWA M36 Manual, of the entire system.
    - Within one year, repair 75% (by water volume) of all leaks detected in the survey that are under the control of the public water system;
    - Thereafter, repair leaks as necessary to reduce permittee's UAW to 10% or the minimum level possible.
- Meter inspection and, as appropriate, repair, replace and calibrate water meters:
    - Large Meters (2" or greater) – within one year
    - Medium Meters (1" or greater and less than 2") – within 2 years
    - Small Meters (less than 1") - within three years
    - Thereafter, calibrate and or replace all meters according to type and specification.
- Bill at least quarterly within three years.
- Water pricing structure sufficient to pay the full cost of operating the system.

Hardship - A permittee may present an analysis of the cost-effectiveness of implementing certain conservation measures included in the MassDEP UAW Water Loss Control Measures and offer alternative measures. Any analysis must explicitly consider environmental impacts and must produce equal or greater environmental benefits.

A permittee's hardship analysis shall:

- Document economic hardship and present an analysis demonstrating that implementation of specific measures will cause or exacerbate significant economic hardship;
- Present reasons why specific measures are not cost-effective because the cost would exceed the costs of alternative methods of achieving the appropriate standard; and
- Propose specific conservation measures that would result in equal or greater system-wide water savings or equal or greater environmental benefits than the conservation measures included in the MassDEP UAW Water Loss Control Measures.

MassDEP will review a permittee's detailed, written analysis to determine whether unique circumstances make specific Best Management Practices (BMPs) less cost-effective than alternatives, or infeasible for the permittee.

Appendix A

TATA & HOWARD

Leakage Component Analysis and Water Loss Control Program

General

In accordance with the Wayland Water Department (WWD) Water Management Act (WMA) Order to Complete (OTC), the WWD is required to submit an unaccounted-for-water (UAW) compliance plan consistent with the Massachusetts Department of Environmental Protection's (MassDEP's) *Functional Equivalence with the 10% UAW Performance Standard*. The WWD is required to complete a "top down" water audit, complete a leakage component analysis (LCA) and develop a water loss control program, implement the water loss control program, and, when requested by the MassDEP, report on its implementation of the water loss control program. An American Water Works Association (AWWA) M36 Water Audit was completed by Tata & Howard, Inc. in 2017 for audit periods 2013, 2014, and 2015. The water audit is included in Appendix A of this Leakage Component Analysis and Water Loss Control Program.

Leakage Component Analysis

The LCA is a tool developed by the Water Research Foundation to help water industries design efficient and sustainable leakage control programs. The LCA takes data from the water audit, system leak and break data, and other system information to analyze the possible strategies to be undertaken by the user to reduce leakage and water loss. Data from the 2015 WWD water audit and 2015 leak data were used to complete the LCA. The LCA worksheets are included in Appendix B of this Leakage Component Analysis and Water Loss Control Program.

The LCA calculates background leakage on tanks, water mains and appurtenances, and water services. Background leaks are defined as individual water loss events (small leaks and weeps at pipe joints) that will continue to flow, with flow rates too low to be detected by sonic methods of an active leakage control program. They can be detected either by chance or when they gradually worsen to the point that they are detected acoustically, become disruptive, and are detected as reported leaks. Background leakage is sensitive to pressure levels. The LCA utilizes the Infrastructure Condition Factor (ICF) when calculating background leakage. A default ICF can be selected based on the age of the distribution system or can be assessed using one of the approaches outlined in the AWWA M36 Manual. The ICF can be assumed to be equal to the Infrastructure Leakage Index (ILI) which is calculated in the AWWA M36 Water Audit. The 2015 ILI for the WWD was 0.94, therefore an ICF of 1.0 was used for the LCA, which is the lowest allowable ICF value. The LCA calculated 0.26 million gallons (mg) lost through the water storage tank, 9.14 mg lost through water mains and appurtenances, and 24.18 mg lost through water service connections. The total background leakage was determined to be 33.58 mg based on the calculations in the LCA.

The WWD reported 5.75 mg lost through water main leaks and 3.68 mg lost through water service connections in 2015 for a total of 9.43 mg. Data from 2015 were provided by the WWD and included information on leaks on water mains and service connections as well as Confidently Estimated Municipal Use (CEMU) as defined by the MassDEP. The 2015 total annual real loss (TARL) was 43.01 mg when the total background leakage and 2015 WWD reported leakage were added together. The real losses as determined by the water audit in 2015 were 44.97 mg.

Therefore, the LCA calculated hidden losses/unreported leakage undetected in 2015 was approximately 1.96 mg.

The LCA compares the WWD's water main failure frequency to the North American Average Failure Frequency and calculates failure frequency for optimized distribution systems. The WWD has 12.7 water main breaks per 100 miles of water main per year. This is below the North American Average Failure Frequency of 25 water main breaks per 100 miles per year and below the optimized distribution failure frequency of 15 water main breaks per 100 miles per year. The LCA also compares the WWD service connection failures to the AWWA Unavoidable Annual Real Losses (UARL) component of reported service line failures. The WWD has 3.6 service breaks per 1,000 service connections per year which is below the UARL of 3.75 service breaks per 1,000 service connections per year.

The LCA provides a tool to evaluate location and repair time reduction options. The WWD's reported average time to locate and repair a water main leak is 0.17 days or 4.0 hours. If that time is reduced 10% to 0.15 days, or 3.6 hours, the WWD would potentially save $43 in leakage volume costs per year. The WWD's reported average time to locate and repair a service line leak is 0.17 days or 4.0 hours. If that time is reduced 10% to 0.15 days, or 3.6 hours, the WWD would potentially save $9 in leakage volume costs per year. The WWD generally has a fast repair time, and it may not be feasible to locate to and repair leaks any faster for such an insignificant cost savings.

The LCA also provides a tool to calculate economic intervention frequency for proactive leak detection based on system characteristics, the AWWA M36 water audit results, the cost of a comprehensive leak detection test, and the average rate of rise of unreported leakage. The WWD reported that the cost of a comprehensive leak detection survey is $9,800 for the entire system or $96.08 per mile based on the system including approximately 102 miles of water main. The average rate of rise of unreported leakage based on calculations using data from the WWD's Annual Statistical Reports (ASR) is 0.01 thousand gallons per mile of main per day in a year (or 10 gallons per mile of main per day in a year). The LCA reports that the potentially recoverable leakage is 0.70 mg/year by having comprehensive leak detection surveys completed, a small portion of the overall real losses of the system.

The final tool that the LCA provides is an evaluation of pressure management opportunities. The WWD has two separate pressure zones in the water distribution system: a small high service area and the main low service area. An alternative way to manage pressure is to operate the water storage tank at a lower level. If the average operating pressure of 80 pounds per square inch (psi) was dropped 2.5-percent to 78 psi, the WWD could potentially save 1.4 mg/year and $1,908 per year at no additional cost. However, to lower the operating range of the one existing water storage tank for the water system by 2 psi or 4.5 feet may not be a viable alternative to maintain satisfactory system conditions and allow the booster pump station at the tank site to function properly, especially considering the marginal benefit in terms of water loss and cost savings.

Water Loss Control Program

The WWD is committed to implementing a water loss control program. This program includes steps that the WWD can take on a scheduled basis to help control water loss. The goal of the program is to reduce water losses and meet the MassDEP 10 percent UAW Standard.

The first step that the WWD can take is an annual AWWA M36 Water Audit. This can be completed during the first quarter of each year for a water audit period of the previous year, and can be completed by either the WWD or their consultant. The focus should be improving the data validity score and on reducing real and apparent losses. The annual water audits will have distinct measurable goals by identifying real and apparent losses. In addition to the water audit, a LCA should be conducted to identify potential background leakage that is running undetected. The data used for the water audit and LCA should be checked for accuracy.

The WWD practices good record keeping and tracks all known water use. The WWD tracks known losses, leaks, repairs, and CEMU as defined by the MassDEP. The CEMU includes water used for firefighting, flushing water mains and hydrants, street sweeping, construction use, tank overflows, and other authorized unbilled uses. Information tracked includes water main breaks and leaks, hydrant leaks, meter leaks, water service leaks, and water released through blow offs. The WWD uses Excel spreadsheets to track these losses, the dates, the size of the water main where the break occurred (if applicable), length of time the WWD is aware of the leak, length of time to repair the break, estimated rate of leak, and estimated total water lost. The WWD should continue to track these losses and practice good record keeping. This will also increase the data validity score of the annual water audit.

The WWD has historically completed one leak detection survey annually, but no surveys were completed in 2018 or 2019. A leak detection survey is planned to be conducted in 2020. The WWD quickly repairs all found leaks and breaks identified by the leak detection. The WWD believes that hiring a professional leak detection firm to complete the surveys of the system is a more effective way of locating leaks than purchasing its own leak detection equipment. All repairs should be recorded on a standard work order form for uniform record keeping.

The water loss control program also includes preventative tasks in addition to reactive measures. A Capital Efficiency Plan™ (CEP) for the WWD was completed by Tata & Howard, Inc. in 2007 and updated in 2016. The purpose of the CEP is to identify areas of the water distribution system in need of rehabilitation, repair, or replacement, and to prioritize improvements to make the most efficient use of the WWD's capital budget. The CEP prioritizes improvement recommendations that are hydraulic improvements, critical improvements, and asset management improvements. By addressing these improvements in a timely fashion, the WWD can avoid potential leaks and breaks in their water distribution system.

The WWD has "General Water Regulations" and "Quick Hydrant and Service Specifications" readily available on their website to ensure all work, repairs, and connections are properly specified and installed. It is important for all work to comply with these regulations and specifications so that unnecessary leakage is not caused.

The WWD initiated planning for an advanced metering infrastructure (AMI) implementation and water meter replacement program in 2017. Several meter manufacturers presented their water meters and AMI to the WWD through which the WWD was able to understand the advantages of the various options. In late 2019, the WWD received proposals for the supply and installation of all necessary AMI equipment and software. In 2020, the WWD received bids for the supply of new water meters. The WWD is currently in the process of awarding the contracts for the procurement of the AMI and water meters. The WWD has begun preparing an Invitation for Bids (IFB) for the installation of the water meters and radio frequency (RF) endpoints. After installed and implemented, the new water meters and AMI will improve meter reading accuracy, reduce unaccounted-for-water, reduce lost revenue, collect meter readings remotely, allow for more frequent billing, and improve customer service. AMI software has the capability to produce alerts for leaks and backflow events, so customer issues can be proactively addressed and high usage customers can be identified and targeted with additional usage and efficiency information.

The WWD has several ways to reduce water loss and continues their efforts for new ways to reduce losses as well. The WWD is confident that water losses will be reduced by following their water loss control plan.